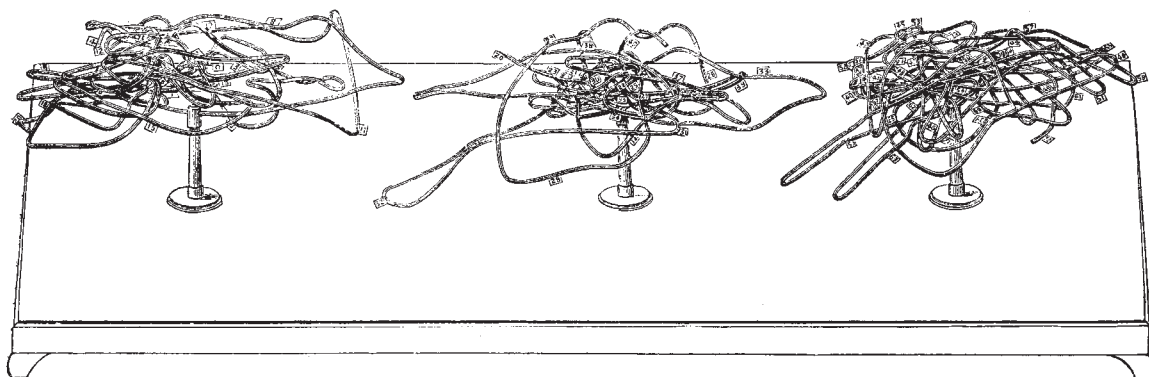


Hitherto the mark values of all subjects, except mathematics, have been equal in the Woolwich examination, and free choice of subjects has been permitted to candidates. This has been fair to young men of different orders of ability; it must have secured officers of varied powers, and has satisfied the schools by leaving them free to do for each boy that which was best for him. In one respect the new scheme is better than the old—viz. in the grouping of the physical science subjects. But with such a bribe as will now be offered for Latin and modern languages, we cannot think that it will often be worth while even for boys of more than average scientific capacity to adopt the study of science if they desire to enter Woolwich. It is evident that, other things being equal, those who do so will come out lower in the list of those who succeed, and be more likely to find themselves amongst those who have failed, than will be the case with such as are of equal ability in the study of languages. We do not believe that it is the intention of the War Office authorities thus to partly bar the way into the scientific branches of the service against young men of more than average promise in the experimental sciences, subjects that will afterwards form a very important part of their work in the Royal Military Academy; and we trust that leaders in science, and the representatives of those schools which are doing their best for their scientific boys, as well as for their unscientific

boys, will not fail to unite in calling attention to the inevitable results of the final adoption of the present scheme. The reception that such representations met with in 1884, and the position accorded to physical science in the course of study for the cadets after having entered Woolwich, cause us to feel sure that such representations will not be without effect, especially if they be not too long delayed.

A MODEL OF AN EARTHQUAKE.

IN the latest part of the Journal of the Science College of the University of Tokio, Prof. Sekiya describes a very curious and remarkable model he has made to exhibit the manner in which a point on the earth's surface moves during an earthquake. Readers who have followed the recent progress of seismometry in Japan are aware that the motion which is recorded at an earthquake observatory is a prolonged series of twists and wriggles of the most complicated kind, so that the path pursued by a point on the surface of the soil has been aptly compared to the form taken by a long hank of string when loosely ravelled together and thrown down in a confused heap. Prof. Sekiya has taken advantage of a very complete earthquake record obtained by him with a set of Prof.



Professor Sekiya's Model of an Earthquake.

Ewing's seismographs to follow out this path step by step, and to represent it, in a permanent form, by means of stiff copper wire. The earthquake he has modelled in this way took place on January 15, 1887, and was unusually severe, for Japan. It has been already described in *NATURE* (vol. xxxvi. p. 107), and we have given there a copy of the seismographic record by help of which the model has been constructed. The seismogram shows the vertical displacement and two rectangular components of the horizontal displacement, instant by instant, throughout the disturbance.

It was only necessary to go through the laborious task of compounding the three displacements in order to find the actual path. This, Prof. Sekiya has done for the first seventy-two seconds of the earthquake—a period which embraces all the most interesting features, although large movements in a horizontal plane continued for a minute more, and small movements for a still longer time.

After the seventy-second second, however, the vertical component of motion had virtually disappeared, so that the later part of the disturbance might be represented by a curve drawn on a horizontal plane. To avoid confusion, the model (a sketch of which is given above) is constructed in three parts: the first and second parts each refer to twenty seconds, the third to thirty-two seconds. The parts are mounted together on a lacquered stand 3 feet long, genuinely Japanese as to its legs, as the

sketch will show. The model represents the absolute motion of the ground magnified fifty times. Little metal labels are attached to the wire to mark successive seconds of time, from 0, where the shock begins, to 72, where the model ends.

Prof. Sekiya is to be congratulated on his patience and skill. The model will serve to show at a glance the real character and enormous complexity of earthquake motion; it may also serve to open the eyes of seismologists of the older school to the perfection to which earthquake measurement has now been brought. We learn by a Japanese advertisement that a native firm (Seirensa and Co., Tokio) has undertaken to sell copies of Prof. Sekiya's model, lacquered stand and all, at a price so low that it should induce many private persons, not to speak of curators of museums and others officially interested in scientific novelties, to possess themselves of this pretty and instructive Japanese "curio."

ANTON DE BARY.

ON January 19, after a painful illness, died Anton De Bary, for many years the Professor of Botany in Strassburg. He had been suffering for some time since his visit to this country in September, and had undergone an operation which entailed the removal of parts of the face, but he did not recover.

He was born in Frankfurt in 1831, and studied in Berlin under Alexander Braun. From an early age he showed extraordinary powers as an original investigator, and was successively Professor of Botany in Freiburg, Halle, and Strassburg, having held the latter distinguished post since 1872. His indefatigable labours as the editor of the *Botanische Zeitung*, since 1867, are well known; and English agriculturists knew him from his admirable exposition of his investigations of the potato disease, in 1861, and in the Journal of the Royal Agricultural Society for 1876.

De Bary's influence on the progress of biology has been enormous, and in attempting to form an estimate of the value of his contributions to science, we must try to picture the state of botany in 1850 or thereabouts, when his labours began.

Little was known of the Thallophytes beyond the apparently endless species-making, which was coming into shape, however, under the discriminating hands of Agardh, Harvey, and Kützinger; Fries, Léveillé, Berkely, and Corda: the zoospores of *Vaucheria* had been seen, and the conjugation of *Spirogyra* was known. Thuret and Nägeli were at work: Hofmeister was publishing his illustrious work on the embryology of the Phanerogams and Cryptogams: von Mohl was creating a new school of vegetable anatomy.

Surrounded by these influences, De Bary was working at the structure and development of the Fungi causing "Rusts" and "Smuts," and in 1853 he published his first book on this subject: Thuret observed the details of the fertilization of *Fucus* in the same year.

De Bary was also occupied with the Algæ, and in 1854 published his observations on *Edogonium* and *Bulbochate*: Pringsheim's papers on *Vaucheria*, *Edogonium*, *Saprolegnia*, and *Coleochate* appeared in 1855-58. The great botanical questions of the day centred around the development of the lower Cryptogams.

Then came De Bary's researches on the *Conjugateæ*, published in 1858, where the essentials of sexual reproduction are described with wonderful accuracy; and this was followed by his observations on the germination of *Lycopodium*, a piece of work so good that although we have only come into possession of most of the remaining facts quite recently, his old figures have been found worth reproducing.

But, as is well known, De Bary abandoned this newer pursuit of the green plants to return to his earlier love, the Fungi; and from about 1860 onwards he sent forth memoirs and books into the world of a nature to shake the tottering hypotheses of the day to their foundations, building up in their place the beginnings of what is rapidly becoming a mighty and coherent superstructure.

Until about 1850 little was known of Fungi beyond the mycelium and spores of the larger forms. The Tulasnes were at work, and had described several of the "Rusts," &c., before De Bary's book came out, and by 1853 the development of the Ergot of rye had been observed. Then followed their brilliant descriptions of the development and germination of the spores of *Cystopus*, *Puccinia*, *Tilletia*, *Ustilago*, and in 1861-65 Tulasne's "Selecta Fungorum Carpologia" appeared.

De Bary was already bringing forward the methods which distinguish his work so eminently from the anatomical method of his predecessors, and by 1863 he had not only cultivated many forms of Fungi, and repeatedly seen the sexual organs of the *Peronosporæ*, but he showed that the fructification of the *Ascomycetes* is also to be traced back to the interaction of sexual organs. These may be regarded as the starting-points of the long series of researches into the sexuality of the Fungi which have already led to such remarkable results, and with which the names of De Bary and his school are so intimately associated.

In 1864, De Bary published the second edition of his book on the *Myxomycetes* (the first edition was in *Zeitschr.*

für Wiss. Zool. 1859), and we ought to point out that the first edition of this work, coming at the time when the observations on zoospores by A. Braun, Thuret, Nägeli, Pringsheim, and De Bary himself, were astounding the botanical world, helped much towards clearer conceptions regarding the "sarcodæ" of the zoologists, and the protoplasm of the botanists.

This year (1864) also saw the first number of the celebrated "Beiträge zur Morph. u. Phys. d. Pilze," and in 1865 were produced the startling results of his further cultures of parasitic Fungi, in which he showed how—by regarding a parasite as an organism to be cultivated on its proper medium, just as we regard wheat as an organism to be grown on suitable soil—its life-history can be followed without those large breaks in continuity which render so much of the anatomical evidence worthless. By means of these researches De Bary proved the entrance of the parasitic Fungus into the host, and its progress in the tissues, so conclusively that any doubts still lurking on the main subject were for ever dispersed. The importance of these results cannot be rated too highly: they not only entirely altered the position of the agriculturist towards his fungoid enemies, but they introduced a new era in medicine. Their bearings on science were simply beyond valuation. From this point onwards the continuous observations of cultures under the microscope became extensive; and in the hands of those who were not too readily deterred by the technical difficulties and the laborious patience of such researches, there sprang up the beginnings of that knowledge of the diseases of plants which is now taking shape under the action of workers trained by De Bary himself.

Nor was this all. The startling facts of heterœcism were at the same time put before the world, and on such evidence that none could reject the phenomenon: De Bary proved that the so-called *Æcidium* of the Berberry is only a phase in the life-history of the *puccinia* of the rust of wheat. The repeated confirmation of this in later years, and the numerous similar cases which have been discovered since, sufficiently attest the accuracy of the original work; while its practical importance is obvious.

In 1866 was published the first edition of the "Morphologie und Physiologie der Pilze, Flechten, und Myxomyceten," a book which gave definiteness to the scattered knowledge of these organisms, and enabled the scientific world to see clearly the remarkable power of the man. His unflinching honesty and rigorous self-criticism and modesty had already attracted the attention of all who came in contact with him or his work; now, however, was seen the marvellous grasp of details, and the power of logical generalization which he possessed, and thenceforward the name of De Bary was associated with the leadership of the modern school of biologists he was himself creating.

As evidence of his untiring industry, it may be pointed out that not only did he publish the second number of the "Beiträge zur Morph. u. Phys. d. Pilze" this year, but he had already taken in hand that monument of laborious investigation and critical reading, the "Comparative Anatomy of the Phanerogams and Ferns," which was not finished until 1877. The years 1869, 1870, and 1871 show indications of his new labours—undertaken, it should be mentioned, because the original plan had been interfered with—in articles in the *Botanische Zeitung*, on the epidermis, on *Cycads*, &c. Nevertheless the third number of the "Beiträge" appeared in 1870, full of new work, and important, on the *Erysiphææ* and *Ascomycetes*.

During 1874 and 1875 he published two papers on the fertilization and germination of *Chara*, and a memoir on *Protomyces*. In 1877 was published his and Strasburger's joint memoir on *Acetabularia*, and the book above referred to—the "Comparative Anatomy of the Ferns and Phanerogams"—was finished. The influence of this work has been enormous: criticism has been cast on the plan and mode of treatment, but probably all botanists

capable of judging are unanimous in praising its extreme accuracy, justice, and completeness. 1878 and 1879 saw the publication of the essays on Apogamy, and on Symbiosis, two bright and suggestive papers, which have had a wide influence on succeeding work, and which connect De Bary's name paternally with new doctrines in biology.

In 1881 he was busy with the promulgation of his new facts and deductions in connection with the *Peronosporæ*, and the phenomenon of apogamy in the Fungi. In addition to articles in the *Botanische Zeitung* on the classification of the Thallophytes generally, and of the Fungi in particular, he published extended and important observations on the *Saprolegniæ* and *Peronosporæ* (the 4th number of the "Beiträge zur Morph. u. Phys. d. Pilze."), and the philosophical scheme of classification of the Fungi which forms the basis of our present system. Space will not admit of our referring further to his other memoirs, and it is impossible to even mention the numerous illuminating ideas and suggestions which are scattered through his papers, for we must proceed to the passing enumeration of his last two books, either of which would have sufficed for the reputation of an ordinary great man.

In 1884 was published his "Comparative Morphology and Biology of the Fungi, Mycetozoa, and Bacteria," and the best idea of De Bary's influence can be obtained by comparing this work with his "Morph. u. Phys. d. Pilze, Flechten, u. Myxomyceten," published eighteen years previously.

In 1885, De Bary brought together a series of lectures on Bacteria, since published in the form of a book: it is in his best style, and brings before the reader by far the clearest trustworthy general account of this astonishing and fruitful subject. Here, as everywhere, to take a subject in hand was to aid it: had De Bary done no more for "bacteriology" than observe and clearly describe the development of the spores of *Bacillus Megaterium*, his influence would have been felt; and the student is especially indebted for his careful sifting of the literature, and his suggestive indications.

One of his latest efforts was on the subject of infection, particularly with reference to certain *Pesize* and *Sclerotia*: he placed firmly on record the discovery that some of these Fungi may be harmless saprophytes until they have been cultivated—educated up to a higher degree of power—and then they can enter into and destroy a living host, which resisted them previously.

It should also be remembered that he was for many years editor of the *Botanische Zeitung*, and lent his aid to the forwarding of numerous botanical projects.

The above sketch may serve to convey some idea of the labours of the great Strassburg botanist. But, although they give a glimpse of the specialist's results, they afford no insight into his keen appreciation of all good work; of his humorous and never malicious disposition, in the laboratory, and in his writings; and of his sharp, but always just, criticism of anything pretentious. Nor is it possible to enter here into his abundant knowledge of species: he was one of the first to grasp Darwin's teachings, and perhaps never misapplied them. His close acquaintance with species and even local varieties of the plants around Strassburg, at any rate, could only be known to those who have walked with him; and the delight of those walks in Alsace!

As a lecturer he was not brilliant: he appeared shy and nervous when on the dais, but in spite of his low voice and restless fingers he kept his hearers interested, and always taught clearly. Quaint he often was, in speech and manner, but the impressive truthfulness of his nature, the earnestness of his teaching, and the absence of any striving after effect, gave to his very quaintness a charm and dignity the influence of which will never be forgotten so long as his pupils live.

H. MARSHALL WARD.

NOTES.

WE print to-day a leading article on "Odium Medicum." As the questions to which it relates have already been fully discussed in the *Times*, it may be well to state that we do not intend to publish any correspondence on the subject.

SOME time ago the Australian Governments, through Sir Graham Berry, represented to the Home Government the fact that in their opinion much good might be done by an "Antarctic reconnaissance," preliminary to an expedition for the thorough exploration of the Antarctic regions. In order that this suggestion might be carried out, the Australian colonies offered to contribute £5000, on condition that a like sum should be given by the mother country. The proposal was supported by the Colonial Office, by the Royal Society, and by the Royal Geographical Society; nevertheless, the Treasury has announced that it does not see its way to the granting of an Imperial contribution. The objects to be attained do not seem to it to justify the payment of even so small a sum as £5000. There will, of course, be much disappointment in the Australian colonies, but it may be hoped that the idea of a joint Antarctic Expedition will not be abandoned. Perhaps a larger scheme than the one which has just been rejected would have had a better chance of success.

THE scientific education of the mining population of Cornwall was for many years in the hands of the Miners' Association of Cornwall and Devon—an institution founded in 1859, at the suggestion of the late Mr. Robert Hunt, F.R.S. Some time ago this body was amalgamated with another Cornish institution, and the united organization took the name of the Mining Association and Institute of Cornwall. A movement has just been set on foot for increasing the efficiency of this Association by the formation of a Museum of Mineralogy, to be established at Redruth, or elsewhere, in the heart of the great tin and copper mining district. It is held that such an institution will in no way interfere with the existing museums in the county—such as those of the Royal Institution at Truro, and of the Royal Geological Society at Penzance. The new museum, instead of seeking to exhibit attractive specimens, will be essentially practical and educational—a place for the earnest student rather than for the casual visitor. It will endeavour to collect characteristic samples of ores, and typical specimens of such other minerals as are of interest to the miner or to the geologist. In recognition of the services which Mr. Robert Hunt rendered to Cornwall by his persistent advocacy of the necessity of giving the young miners a scientific training, it is proposed that the new museum shall bear his name. The Committee appeals for contributions, either in money or in minerals, and for suggestions as to the development of the scheme. Communications should be addressed to Mr. T. C. Peter, Town Hall, Redruth.

MR. J. E. HARTING has been appointed Librarian and Assistant Secretary to the Linnean Society at Burlington House, in the place of Dr. Murie, resigned. Mr. Harting has for some years past been engaged in fulfilling the duties of Zoological Librarian at the Natural History Museum, South Kensington, where he has organized what is now the best zoological library in this country, although possibly not the largest in regard to the number of volumes. The new appointment has been made opportunely at the expiration of the Government grant for the purchase of books at South Kensington, and has given general satisfaction.

THE forty-first annual general meeting of the Institution of Mechanical Engineers will be held on Thursday, February 2, and Friday, February 3, at 25 Great George Street, Westminster. The chair will be taken by the President, Mr. Edward H. Carbutt, at half-past 7 p.m. on each evening. The discussion on Mr. John Richards's paper, on "Irrigating Machinery,"